CLAIMS

1) A linear diene elastomer resulting from at least one conjugated diene, characterised in that it comprises cyclic vinyl units in a mass content of greater than or equal to 15% and in that it has a number-average molecular weight falling within a range of from 10,000 to 300,000 g/mol.

2) A linear diene elastomer according to Claim 1, characterised in that said number-average molecular weight falls within a range of from 60,000 to 300,000 g/mol.

3) A linear diene elastomer according to Claim 2, characterised in that said number-average molecular weight falls within a range of from 100,000 to 300,000 g/mol.

4) A linear diene elastomer according to Claim 1, characterised in that said mass content of cyclic vinyl units is greater than or equal to 20%.

5) A linear diene elastomer according to Claim 1, characterised in that it comprises a mass fraction of units resulting from conjugated dienes of greater than 30%.

6) A linear diene elastomer according to Claim 5, characterised in that it consists of a butadiene homopolymer or a copolymer of butadiene and a vinyl aromatic compound.

7) A linear diene elastomer according to Claim 1, characterised in that said number-average molecular weight falls within a range of from 10,000 to 30,000 g/mol and in that said mass content of cyclic vinyl units is greater than or equal to 35%.

8) A branched diene elastomer resulting from at least one conjugated diene and capable of being obtained by reaction of a linear diene elastomer according to one of the preceding Claims with a branching agent, characterised in that it comprises cyclic vinyl units in a mass content of greater than or equal to 15% and in that it has a number-average molecular weight falling within a range of from 30,000 to 350,000 g/mol.

9) A branched diene elastomer according to Claim 8, characterised in that said number-average molecular weight falls within a range of from 150,000 to 350,000 g/mol.

10) A branched diene elastomer according to Claim 8, characterised in that said mass content of cyclic vinyl units is greater than or equal to 20%.

11) A branched diene elastomer according to Claim 8, characterised in that it comprises a mass fraction of units resulting from conjugated dienes of greater than 30%.

12) A branched diene elastomer according to Claim 11, characterised in that it consists of a homopolymer of butadiene or a copolymer of butadiene and a vinyl aromatic compound.

13) A process for the production of a linear or branched diene elastomer resulting from at least one conjugated diene, said elastomer comprising cyclic vinyl units in a mass content of greater than or equal to 15% and, prior to optional branching, having a number-average molecular weight falling within a range of from 10,000 to 60,000 g/mol, characterised in that said process comprises the anionic polymerisation of one or more monomers comprising at least one conjugated diene monomer, by the discontinuous reaction, in an inert aliphatic or alicyclic hydrocarbon solvent, of said monomer or monomers with a catalytic system comprising an organolithium initiator and a polar agent comprising two or more heteroatoms, the (polar agent:initiator) molar ratio being greater than 8.

14) A process for the production of a linear or branched diene elastomer resulting from at least one conjugated diene, said elastomer comprising cyclic vinyl units in a mass content of greater than or equal to 15% and, prior to optional branching, having a number-average molecular weight falling within a range of from 10,000 to 100,000 g/mol, characterised in that said process comprises the anionic polymerisation of one or more monomers comprising at least one conjugated diene monomer, by the continuous reaction, in an inert aliphatic or alicyclic hydrocarbon solvent, of said monomer or monomers with a

catalytic system comprising an organolithium initiator and a polar agent comprising two or more heteroatoms, said system satisfying the following relationship:

(i)   the (polar agent:initiator) molar ratio is greater than or equal to 3.

15) A process for the production of a linear or branched diene elastomer resulting from at least one conjugated diene, said elastomer comprising cyclic vinyl units in a mass content of greater than or equal to 15% and, prior to optional branching, having a number-average molecular weight falling within a range of from 10,000 to 300,000 g/mol, characterised in that said process comprises the anionic polymerisation of one or more monomers comprising at least one conjugated diene monomer, by the continuous reaction, in an inert aliphatic or alicyclic hydrocarbon solvent, of said monomer or monomers with a catalytic system comprising an organolithium initiator, a polar agent comprising two or more heteroatoms, and an alkali metal salt of an aliphatic or alicyclic alcohol, such that said system simultaneously satisfies the following three conditions:

(i)   the (polar agent:initiator) molar ratio is greater than or equal to 3.

(ii)   the (salt:initiator) molar ratio falls within a range of from 0.01 to 2, and

(iii)   the (salt:polar agent) molar ratio falls within a range of from 0.001 to 0.5.

16) A process for the production of a linear or branched diene elastomer according to Claim 14, characterised in that the (polar agent:initiator) molar ratio is greater than or equal to 5.

17) A process for the production of a linear or branched diene elastomer according to Claim 16, characterised in that the (polar agent:initiator) molar ratio is greater than or equal to 10.

18) A process for the production of a linear or branched diene elastomer according to Claim 17, characterised in that the (polar agent:initiator) molar ratio is greater than or equal to 15.

19) A process for the production of a linear or branched diene elastomer according to Claim 15, characterised in that said (salt:polar agent) molar ratio falls within a range of from 0.001 to 0.1.

20) A process for the production of a linear or branched diene elastomer according to Claim 15, characterised in that said (salt:initiator) molar ratio falls within a range of from 0.01 to 0.6.

21) A process for the production of a linear or branched diene elastomer according to Claim 20, characterised in that said (salt:initiator) molar ratio falls within a range of from 0.01 to 0.2.

22) A process for the production of a linear or branched diene elastomer according to Claim 21, characterised in that said (salt:initiator) molar ratio falls within a range of from 0.3 to 0.6.

23) A process for the production of a linear or branched diene elastomer according to Claim 13, characterised in that said polar agent belongs to the group consisting of diamines and diethers.

24) A process for the production of a linear or branched diene elastomer according to Claim 23, characterised in that said polar agent is tetramethylethylenediamine.

25) A process for the production of a linear or branched diene elastomer according to Claim 15, characterised in that said salt is a sodium salt of an aliphatic alcohol having from 3 to 12 carbon atoms, such as sodium tert.-amylate.

26) A process for the production of a branched diene elastomer according to Claim 13, characterised in that it further involves reacting the product of said polymerisation with a coupling or starring agent in order to obtain said branched diene elastomer.

27) A catalytic system usable for producing, by continuous or discontinuous anionic polymerisation of one or more conjugated dienes in an inert aliphatic or alicyclic hydrocarbon solvent, a linear diene elastomer comprising cyclic vinyl units in a mass content of greater than or equal to 15% and having a number-average molecular weight falling within the range of from 10,000 to 60,000 g/mol, said system comprising an organolithium initiator and a polar agent comprising two or more heteroatoms, characterised in that the (polar agent:initiator) molar ratio is greater than 8.

28) A catalytic system according to Claim 27, characterised in that said (polar agent:initiator) molar ratio is greater than or equal to 10.

29) A catalytic system according to Claim 28, characterised in that said (polar agent:initiator) molar ratio is greater than or equal to 15.

30) A catalytic system usable for producing, by continuous anionic polymerisation of one or more conjugated dienes in an inert aliphatic or alicyclic hydrocarbon solvent, a linear diene elastomer according to Claim 1, characterised in that said system comprises an organolithium initiator, a polar agent comprising two or more heteroatoms and an alkali metal salt of an aliphatic or alicyclic alcohol, said system simultaneously satisfying the following three conditions:

(i')   the (polar agent:initiator) molar ratio is greater than 8,

(v)   the (salt:initiator) molar ratio falls within a range of from 0.01 to 2, and

(vi)   the (salt:polar agent) molar ratio falls within a range of from 0.001 to 0.5.

31) A catalytic system according to Claim 30, characterised in that said (salt:initiator) molar ratio falls within a range of from 0.01 to 0.2 or from 0.3 to 2, and in that said (salt:polar agent) molar ratio falls within a range of from 0.001 to 0.1.

32) A catalytic system according to Claim 31, characterised in that said (salt:initiator) molar ratio falls within a range of from 0.01 to 0.2.

33) A catalytic system according to Claim 31, characterised in that said (salt:initiator) molar ratio falls within a range of from 0.3 to 0.6.

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34) A catalytic system according to Claim 27, characterised in that said polar agent belongs to the group consisting of diamines and diethers.

35) A catalytic system according Claim 34, characterised in that said polar agent is tetramethylethylenediamine.

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36) A catalytic system according to Claim 30, characterised in that said salt is a sodium salt of an aliphatic alcohol having from 3 to 12 carbon atoms, such as sodium tert.-amylate.